

WHAT IS CLAIMED IS:

1           1.    A system for supplying desired digital  
2   information to a receiver comprising:  
3           a broadband digital information source;  
4           a series of three or more links between said  
5   broadband digital information source and said receiver,  
6   wherein digital information supplied from said broadband  
7   digital information source travels via each link in said  
8   series to said receiver;  
9           a first interface between a first link of said  
10   series coupled to said receiver, and a second link of said  
11   series;  
12           a second interface between said second link and a  
13   third link of said series; and  
14           wherein said first interface receives via said first  
15   link a message selecting a desired stream of digital  
16   information and responds to said message by:  
17           determining if said desired stream of digital  
18   information is currently available to said first interface via  
19   said second link,  
20           if said desired stream of digital information  
21   is currently available via said second link, forwarding said  
22   desired stream to said receiver via said first link; and  
23           if said desired stream of digital information  
24   is currently unavailable at an input of said first interface,  
25   forwarding a second message from said first interface to said  
26   second interface via said second link, requesting that said  
27   desired digital stream be placed on said second link if  
28   available to said second interface via said third link.

1           2.    The system of claim 1 wherein said receiver  
2   comprises a further interface to a further series of links to  
3   a subscriber unit.

1           3.    The system of claim 1 wherein said receiver  
2   comprises a subscriber unit.

1           4.    The system of claim 1 wherein said broadband  
2 digital information source comprises an information server.

1           5.    The system of claim 1 wherein said digital  
2 information supplied by said broadband digital information  
3 source comprises video information.

1           6.    The system of claim 1 wherein said digital  
2 information supplied by said broadband digital information  
3 source comprises audio information.

1           7.    The system of claim 1 wherein said digital  
2 information supplied by said broadband digital information  
3 source comprises interactive service information.

1           8.    The system of claim 1 wherein said digital  
2 information supplied by said broadband digital information  
3 source comprises textual information.

1           9.    The system of claim 1 wherein said digital  
2 information supplied by said broadband digital information  
3 source comprises graphical information.

1           10.   The system of claim 1 wherein said digital  
2 information supplied by said broadband digital information  
3 source comprises binary computer data.

1           11.   The system of claim 1 wherein said receiver  
2 unit receives information from said broadband information  
3 source identifying available streams of digital information  
4 and corresponding codes to be included within said message to  
5 identify said desired stream.

1           12.   The system of claim 2 wherein a first link of  
2 said series of links that is directly coupled to said  
3 subscriber unit comprises a twisted pair telephone line and an  
4 interface between said first link and a next link toward said  
5 broadband digital information source comprises a pedestal.

1           13. A system for broadcasting digital information  
2 to a plurality of receivers comprising:

3           an interface coupled to said plurality of receivers  
4 and to a broadband communications network,

5           said interface comprising:

6           means for receiving a first message from a first one  
7 of said plurality of receivers, said first message including a  
8 first request for a desired stream of information;

9           means for responding to said first message in real-  
10 time by retrieving said desired stream from said broadband  
11 communications network and forwarding said desired stream to  
12 said first one of said receivers, said desired stream  
13 thereafter being available at an input of said interface;

14           means for receiving a second message from a second  
15 one of said plurality of receivers, said second message  
16 including a second request for said desired stream of  
17 information, said second message being received after said  
18 first message; and

19           means for responding to said second message by  
20 forwarding said desired stream of information as available at  
21 said input of said interface to said second one of said  
22 receivers.

1           14. The system of claim 13 wherein said means for  
2 responding to said first message comprises:

3           means for determining if said desired stream is  
4 already available on said broadband communication network;

5           means for, if said desired stream is unavailable,  
6 forwarding said first request through said broadband  
7 communication network to an information source that responds  
8 by placing said desired stream on said broadband communication  
9 network.

1           15. The system of claim 13 wherein said means for  
2 responding to said first message comprises:

3           means for determining if said desired stream is  
4 already available on said broadband communication network;

means for, if said desired stream is unavailable, forwarding said first request through said broadband communication network to a further interface that responds by retrieving said desired stream from a further broadband communication network.

16. The system of claim 13 wherein said plurality of receivers are a plurality of subscriber units.

17. The system of claim 16 wherein said interface comprises a program selection monitor that monitors and logs program request messages received from said subscriber units.

18. In a system for broadcasting digital information comprising a broadband digital information source, a plurality of receivers, a first interface coupled to said plurality of receivers, a series of one or more links between said first interface and said broadband digital information source, and a series of one or more interfaces interconnecting said links, a method for providing a receiver with a desired stream of digital information from said broadband digital source:

detecting at said first interface a message from a requesting one of said receivers requesting said desired stream of digital information;

checking if said desired stream of digital information is currently provided to said first interface via said series of links;

if said desired stream is currently provided, relaying said desired stream from said first interface to said requesting receiver;

if said desired stream is not currently provided,  
a) forwarding a request for said desired stream through said series of interfaces toward said broadband source until one of said interfaces has said desired stream currently available at an input and responds to said request by forwarding said desired stream to said first interface;

b) relaying said desired stream from said first interface to said requesting receiver; and

c) marking said desired stream as being currently provided to said first interface and available for relaying to further requesting receivers.

19. The method of claim 18 wherein said requesting receiver comprises an interface to a further series of one or more links to a subscriber unit, said message has been originated by said subscriber unit and transmitted to said requesting receiver via said further series of one or more links, and said method further comprises the step of:

relaying said desired stream from said requesting receiver to said subscriber unit via a further series of one or more links.

20. In a public switched telephone network comprising a broadband network interconnected to a plurality of subscriber units by a plurality of twisted pair lines, a pedestal for interfacing between said broadband network and said twisted pair lines, said pedestal comprising:

means for exchanging digital information with said broadband network;

means for exchanging digital information with said subscriber units via said twisted pair lines;

means for receiving messages from said subscriber units, said messages identifying streams of digital information desired to be received at said subscriber units; and

means for extracting said desired streams of digital information from said broadband network using information contained in said messages received from said subscriber units and relaying said desired streams to said subscriber units.

21. The pedestal of claim 20 wherein said streams of digital information comprise streams of packets and said extracting means comprise means for identifying packets belonging to said desired streams.

1           22.    The pedestal of claim 21 wherein said packets  
2   comprise MPEG packets.

3           23.    The pedestal of claim 21 wherein said packets  
4   comprise ATM cells.

1           24.    The pedestal of claim 20 wherein said means  
2   for exchanging information with said broadband network  
3   comprises an ATM interface.

1           25.    The pedestal of claim 20 wherein said means  
2   for exchanging information with said broadband network  
3   comprises a fiber optic interface.

1           26.    The pedestal of claim 20 wherein said means  
2   for exchanging digital information with said subscriber units  
3   comprises a plurality of ADSL modems.

1           27.    The pedestal of claim 20 wherein said digital  
2   information comprises video information.

1           28.    The pedestal of claim 20 further comprising  
2   means for logging said messages to monitor program selections.

3           29.    The system of claim 13 wherein said interface  
4   is coupled to said receivers via a plurality of twisted pair  
5   access lines.

1           30.    The system of claim 13 wherein said interface  
2   is coupled to said receivers via a shared physical medium with  
3   a unique channel being reserved for communication with each  
4   receiver.

5           31.    An interface between a satellite broadcast  
6   system and a plurality of subscriber units, said interface  
7   comprising:

a plurality of access lines connecting said interface to individual ones of said plurality of subscriber units;

a plurality of satellite broadcast receivers, each said receiver operative to demodulate a satellite broadcast signal and extract one or more MPEG transport streams;

means for receiving messages from requesting ones of said subscriber units including identifiers identifying particular MPEG transport streams received by said plurality of receivers; and

means for responding to said messages by filtering said particular MPEG transport streams from all MPEG transport streams received by said receiver and relaying said particular MPEG transport streams to requesting ones of said subscriber units.

32. A system for supplying desired digital information to a receiver comprising:

a broadband digital information source;

a series of two or more links between said broadband digital information source and said receiver, wherein digital information supplied from said broadband digital information source travels via each link in said series to said receiver, said digital information comprising MPEG packets; and

an interface between at least one pair of adjoining links in said series; and

wherein said receiver sends a message to said interface selecting a desired MPEG transport stream of digital information and said interface responds to said message by selecting said desired MPEG transport stream from multiple streams of digital information already received at an input of said interface from said digital information source via one or more of said series of links and relaying said desired stream to said receiver via a remaining one or more of said series of links.

33. The system of claim 32 wherein said interface is further coupled to a further broadband digital information

source via a further series of links, further streams of digital information being available from said further broadband digital information source for relaying to said receiver.

34. The system of claim 32 wherein said receiver receives from said interface a service information stream that includes identifiers of available MPEG transport streams, said identifiers being usable within said message to specify said desired MPEG transport stream.

35. A system for supplying desired digital information to a receiver comprising:  
a broadband digital information source;  
a series of two or more links between said broadband digital information source and said receiver, wherein digital information supplied from said broadband digital information source travels via each link in said series to said receiver, a last link of said series to said receiver being an ADSL connection via a twisted pair line, and  
an interface between at least one pair of adjoining links in said series; and  
wherein said receiver sends a message to said interface selecting a desired stream of digital information and said interface responds to said message by selecting said desired stream from multiple streams of digital information already received at an input of said interface from said digital information source via one or more of said series of links and relaying said desired stream to said receiver via a remaining one or more of said series of links.

36. A system for supplying desired digital information to a receiver comprising:  
a broadband digital information source;  
a series of two or more links between said broadband digital information source and said receiver, wherein digital information supplied from said broadband digital information source travels via each link in said series to said receiver,



8 at least one of said links being a switched ATM network that  
9 carries said digital information in the form of ATM cells; and  
10 an interface between at least one pair of adjoining  
11 links in said series; and

12 wherein said receiver sends a message to said  
13 interface selecting a desired stream of digital information,  
14 said message including identifier information specifying said  
15 desired stream and said interface responds to said message by  
16 1) using identifier information to segregate cells belonging  
17 to said desired stream from multiple streams of digital  
18 information already received at an input of said interface  
19 from said digital information source via one or more of said  
20 series of links, and 2) relaying said desired stream to said  
21 receiver via a remaining one or more of said series of links.

22 37. The system of claim 36 wherein said identifier  
23 information comprises a Virtual Path Identifier (VPI) and a  
24 Virtual Connection Identifier (VCI) of cells belonging to said  
25 stream.

1 38. The system of claim 36 wherein said interface  
2 employs ADSL to communicate with said receivers via said  
3 plurality of twisted pair access lines.

4 39. In a digital communication system including a  
5 plurality of subscriber units, a digital information  
6 transmission system coupled to said plurality of subscriber  
7 units by a communication network, comprising:

8 means for transmitting a digital information stream  
9 of a predetermined duration to one or more of said subscriber  
10 units via said communication network over a predetermined  
11 channel beginning at a predetermined time; and

12 scheduling means coupled to said transmitting means  
13 for

14 if a request for said digital information  
stream is received prior to said predetermined time,  
initiating transmission of said digital information stream at  
said predetermined time starting at a beginning of said

digital information stream over said predetermined channel;  
and

if said request for said digital information stream is received after said predetermined time, initiating transmission of said digital information stream at a point in said digital information stream determined relative to said predetermined time so that said digital information stream ends said predetermined duration after said predetermined time.

40. The system of claim 39 wherein said request is received from a subscriber unit.

41. The system of claim 40 wherein said plurality of subscriber units includes privileged and non-privileged subscriber units and said scheduling means accepts requests for said digital information stream only from privileged subscriber units.

42. The system of claim 39 wherein said scheduling means further comprises means for:

if no request for said digital information stream is received, accepting requests for an alternative digital information stream on said channel, and using said transmitting means to transmit information relating to said alternative digital information stream over said channel.

43. The system of claim 42 wherein said scheduling means further comprises means for:

upon receipt of a request for said digital information stream within said predetermined duration after said predetermined time, terminating transmission of information relating to said alternative digital information stream.

44. The system of claim 39 wherein said scheduling means further comprises means for:

3 if no request for said digital information stream is  
4 received, initiating transmission of an alternative digital  
5 information stream over said channel from said predetermined  
6 time until said request for said digital information stream is  
7 received.

1 45. The system of claim 44 wherein said scheduling  
2 means further comprises means for:

3 upon receipt of a request for said digital  
4 information stream, terminating transmission of said  
5 alternative digital information stream.

1 46. The system of claim 39 wherein said  
2 communication network is a hierarchical network  
3 interconnecting said digital information transmission system  
4 and said plurality of subscriber units.

1 47. The system of claim 39 wherein said  
2 communication network is a shared communication medium  
3 interconnecting said digital information transmission system  
4 and said plurality of subscriber units.

1 48. The system of claim 39 wherein said  
2 transmitting means is an MPEG multiplexer.

1 49. The system of claim 40 wherein said scheduling  
2 means further comprises:

3 means for, once transmission of said digital  
4 information stream has been initiated, receiving messages from  
5 further subscriber units indicating that said digital  
6 information stream is being monitored and receiving further  
7 messages from subscriber units indicating that said digital  
8 information stream is no longer being monitored, and upon a  
9 determination that no subscriber unit of said plurality is  
10 currently monitoring said digital information stream,  
11 thereafter terminating transmission of said digital  
12 information stream and accepting requests for transmitting  
13 alternative services over said channel.

1 50. The system of claim 39 wherein said channel is  
2 an MPEG multiplexed packet stream allocation.

1 51. The system of claim 39 wherein said channel is  
2 a frequency allocation.

1 52. The system of claim 39 wherein said channel is  
2 an ATM virtual connection.

1 53. In a digital information transmission system  
2 coupled to a plurality of subscriber units via a communication  
3 network, said subscriber units including privileged and non-  
4 privileged subscriber units, a system for allocating access to  
5 a channel among said subscriber units, said system comprising:  
6 means for transmitting a content stream from a  
7 plurality of available content streams over said channel, said  
8 available content streams including general access content  
9 streams and limited access content streams;

10 means for receiving a request specifying a desired  
11 content stream from one of said plurality of subscriber units;

12 prioritization means, coupled to said receiving  
13 means and transmitting means, for initiating transmission of a  
14 limited access content stream over said channel only if a  
15 request for said limited access stream is received from a  
16 privileged subscriber unit, and for initiating access to a  
17 general access content stream only if no request from a  
18 privileged subscriber unit for a limited access stream is  
19 currently being fulfilled.

20 54. The system of claim 53 wherein said  
21 prioritization means further comprises:

22 means for, once transmission of said limited access  
23 content stream has been initiated, receiving messages from  
24 further privileged subscriber units indicating that said  
25 limited access content stream is being monitored and receiving  
26 further messages from privileged subscriber units indicating  
27 that said is no longer being monitored, and upon a  
28 determination that no privileged subscriber unit is currently

monitoring said limited access content stream, thereafter terminating transmission of said limited access content stream and accepting requests for transmitting general access content streams over said channel.

55. The system of claim 53 wherein said channel is an MPEG multiplexed packet stream allocation.

56. The system of claim 53 wherein said channel is a frequency allocation.

57. The system of claim 53 wherein said communications network comprises a hierarchical network interconnecting said video transmission system and said plurality of subscriber units.

58. The system of claim 53 wherein said transmitting means is an MPEG multiplexer.

59. In a digital information transmission system coupled to a plurality of subscriber units via a communications network, a digital information stream server having a channel for communication to said subscriber units, said system comprising:

means for storing a plurality of content streams, said content streams including general access content streams and limited access content streams;

means for transmitting a content stream from said plurality of said content streams over said channel;

means for receiving a request specifying a desired content stream from one of said plurality of subscriber units; and

prioritization means, coupled to said receiving means and transmitting means, for initiating transmission of a limited access content stream over said channel only if a request for said limited access stream is received, and for initiating access to a general access content stream only if

19 no request for a limited access stream is currently being  
20 fulfilled.

1 60. A digital information distribution system  
2 comprising:

3 a digital information stream server comprising:  
4 means for storing a digital information stream  
5 of predetermined duration;

6 network adaptation means for transmitting  
7 digital information onto a first communication network on a  
8 predetermined channel;

9 request receiving means for receiving requests  
10 for said digital information stream from said first  
11 communication network;

12 scheduling means for directing said digital  
13 information stream to said network adaptation means for  
14 transmission over said first communication network on said  
15 predetermined channel at a predetermined time, if a request  
16 for said digital information stream is received by said  
17 request receiving means;

18 opportunistic programming means for directing  
19 digital information to said network adaptation means for  
20 transmission over said first communication network only if  
21 said digital information stream is not being transmitted;

22 a network interface coupled to said first  
23 communication network for connecting said first communication  
24 network to a plurality of subscriber units via a second  
25 communication network, said network interface comprising:

26 request receiving means for receiving requests  
27 originating from said subscriber units, said subscriber units  
28 including privileged subscriber units and non-privileged  
29 subscriber units;

30 request relay means for relaying only requests  
31 from privileged subscriber units for said digital information  
32 stream to said digital information stream server; and

33 means for relaying said digital information  
34 stream from said first communication network to said

35 requesting ones of said privileged subscriber units via said  
36 second communication network.

37 61. The system of claim 60 wherein said scheduling  
38 means further comprises means for:

39 if a request for said digital information stream is  
40 received prior to a predetermined time, initiating  
41 transmission of said digital information stream starting at a  
42 beginning of said digital information stream over said  
43 predetermined channel at said predetermined time; and

44 if said request for said digital information stream  
45 is received after said predetermined time, initiating  
46 transmission of said digital information stream at a point in  
47 said digital information stream determined relative to said  
48 predetermined time so that said digital information stream  
49 ends said predetermined duration after said predetermined time.

50 62. The system of claim 60 wherein said first  
51 communication network is a hierarchical network.

52 63. The system of claim 60 wherein said second  
53 communication network is a hierarchical network.

54 64. The system of claim 60 wherein said network  
55 interface further comprises:

56 cancellation request means for receiving via  
57 said second communication network messages from privileged  
58 subscriber units indicating that they are no longer monitoring  
59 said digital information stream; and

60 means for, when no privileged subscriber unit  
61 is monitoring said digital information stream through said  
62 network interface, transmitting a cancellation request on said  
63 first communication network and halting transmission of said  
64 digital information stream via said second communication  
65 network.

66 65. The system of claim 60 wherein said  
67 opportunistic programming means transmits digital information

via said channel only upon request of a subscriber unit when said digital information stream is not being transmitted.

66. The system of claim 60 wherein said opportunistic programming means transmits digital information via said channel whenever said digital information stream is not being transmitted.

67. The system of claim 60 wherein said digital information transmitted by said opportunistic programming means comprises an alternative video program.

68. The system of claim 60 wherein said digital information transmitted by said opportunistic programming means comprises computer data.